

## WEST Search History

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L6: Entry 1 of 1

File: USPT

Jun 6, 2000

DOCUMENT-IDENTIFIER: US 6073015 A

TITLE: System and method of providing services when the mobile is home registered in a microcellular network and receives support from a macrocellular network

Application Filing Date (1):

19960711

Brief Summary Text (3):

When the macrocellular communication network is formed of a GSM network, a mobility server positioned in the microcellular communication network is coupled to the GSM network and appears to the GSM network as a mobile services switching center (MSC) thereof. The wide-area, mobility management functions are used by the mobility servers of both the subscriber unit's "home" network and the "visited" network into which the subscriber unit roams thereby to provide wide-area mobility to the mobile

Brief Summary Text (13):

It is sometimes desirable to permit a mobile subscriber unit, regularly registered in one microcellular communication network (the "home" network), also to communicate in another microcellular communication network (the "visited" network). For instance, a business might have separate office locations, requiring separate microcellular networks to be installed for each of the separate office locations. It is sometimes desirable, in such instances, to permit personnel regularly located at one of the office locations to be able to communicate by way of a microcellular communication network even when the personnel are temporarily positioned at the other one of the office locations.

Brief Summary Text (25):

In an another aspect of the present invention, calls originated at a Public Switched Telephone Network (PSTN) to be terminated to a mobile subscriber unit of the "home" microcellular communication network are routed to the subscriber unit when the subscriber unit roams beyond the "home" network and into a "visited" network. In one exemplary routing method, the call is routed via the home microcellular communication network to a gateway mobile services switching center (GMSC) of the macrocellular communication network, and the GMSC interrogates the home location register of the macrocellular network to obtain routing information to route the call to the roaming, subscriber unit. The HLR requests and receives information from the mobility server of the "roaming" microcellular network. Such information is provided to the GMSC, and the call is routed to the mobile subscriber unit, to be terminated thereat.

CLAIMS:

6. The apparatus of claim 3 wherein the communication system further comprises a remote communication station operable in the macrocellular communication network, wherein the first mobility server is operable to receive call requests from the mobile subscriber unit requesting call communications with the remote communication station, and wherein said first storage device further stores a service profile, the service profile accessed by said first mobility manager prior to routing the

call request to the macrocellular communication network.

11. The apparatus of claim 10 wherein said first storage device further stores a service profile, the service profile including information indicative of services to which the mobile subscriber unit is subscribed, and wherein the service profile is accessed by said first mobility manager when the mobile subscriber unit requests a call when positioned at the locations encompassed by at least either the first microcellular communication network or the second microcellular communication network.

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L4: Entry 1 of 31

File: PGPB

Jun 19, 2003

DOCUMENT-IDENTIFIER: US 20030114151 A1

TITLE: METHOD AND ARRANGEMENT FOR HANDLING NETWORK SPECIFIC SUBSCRIBER DATA DURING ROAMING BY USE OF SIM CARD INFORMATION STORAGE

Application Filing Date:19990625Summary of Invention Paragraph:

[0012] The invention also relates to a method for implementing the acquisition of data relating to network-specific supplementary services in a telecommunications system, which comprises at least two mobile systems, which in turn comprise user terminals and mobile networks comprising mobile switching centres and subscriber databases, at least one user terminal functioning not only in a home network but also in at least one visited network, said terminal supporting at least one network-specific supplementary service in said visited network, the method comprising the steps of

Summary of Invention Paragraph:

[0014] transferring the data relating to the common services of the home network and the visited network, in connection with the registration, from the subscriber database of the home network for temporary storage to the subscriber database of the visited network. The invention is characterized in that the method further comprises

Summary of Invention Paragraph:

[0018] The invention also relates to a method according to claim 16 for updating subscriber data relating to network-specific supplementary services in a telecommunications system, which comprises at least two mobile systems, which in turn comprise user terminals and mobile networks comprising mobile switching centres and subscriber databases, at least one user terminal functioning not only in a home network but also in at least one visited network, said terminal supporting at least one network-specific supplementary service in said visited network. The method is characterized by

Summary of Invention Paragraph:

[0025] Home network here refers to that mobile network where the subscriber's user terminal is registered. Visited network correspondingly here refers to a mobile network which is not the subscriber's home network, but where the subscriber's user terminal can function.

Summary of Invention Paragraph:

[0026] The invention is based on the idea that subscriber data related to network-specific supplementary services is stored in those parts of the mobile system that are managed by the subscriber and the operator providing the supplementary services. In the solution according to the invention, subscriber data relating to network-specific supplementary services is permanently stored in the subscriber identity module of the subscriber terminal, from where it is transferred for temporary storage to the subscriber database of a visited network. Other subscriber data are read as usually from the subscriber database of the subscriber's home

network. This allows limiting the changes concerning network-specific services to the network offering the service concerned. For instance, data relating to supplementary services of other networks are not needed in the subscriber database of the home network. Subscriber data related to network-specific services are transferred between the home network and a visited network using the protocols of the home network already available. The solution also includes the possibility of using a radio interface to change subscriber data relating to network-specific supplementary services from the network providing a particular service.

## CLAIMS:

13. A method for implementing the acquisition of data relating to network-specific supplementary services in a telecommunications system, which comprises at least two mobile systems, which in turn comprise user terminals (11) and mobile networks (10, 30) comprising mobile switching centres (32) and subscriber databases (24, 31, 34), at least one user terminal (11) functioning not only in a home network (10) but also in at least one visited network (20, 30), said terminal supporting at least one network-specific supplementary service in said visited network, the method comprising the steps of initiating by said at least one user terminal the registration in the visited network, which comprises at least one network-specific supplementary service; transferring the subscriber data relating to the common services of the home network and the visited network, in connection with the registration, from the subscriber database (14) of the home network for temporary storage to the subscriber database (34) of the visited network, characterized by, in addition, permanently storing the subscriber data relating to the network-specific supplementary services of the visited network in the identity module (12) of the user terminal (11), transmitting, at least in connection with the registration in the visited network, the subscriber data relating to the network-specific supplementary services from the identity module (12) of the user terminal (11) for temporary storage to the subscriber database (34) of the visited network.

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L4: Entry 2 of 31

File: USPT

Jun 1, 2004

DOCUMENT-IDENTIFIER: US 6745029 B2

TITLE: Method and arrangement for handling network specific subscriber data during roaming by use of SIM card information storage

Application Filing Date (1):  
19990625

Brief Summary Text (15):

The invention also relates to a method for implementing the acquisition of data relating to network-specific supplementary services in a telecommunications system, which comprises at least two mobile systems, which in turn comprise user terminals and mobile networks comprising mobile switching centres and subscriber databases, at least one user terminal functioning not only in a home network but also in at least one visited network, said terminal supporting at least one network-specific supplementary service in said visited network, the method comprising the steps of initiating by said at least one user terminal the registration in the visited network, which comprises at least one network-specific supplementary service; transferring the data relating to the common services of the home network and the visited network, in connection with the registration, from the subscriber database of the home network for temporary storage to the subscriber database of the visited network. The invention is characterized in that the method further comprises permanently storing the subscriber data relating to the network-specific supplementary services of the visited network in the identity module of the user terminal, transmitting, at least in connection with the registration in the visited network, the subscriber data relating to the network-specific supplementary services from the identity module of the user terminal for temporary storage to the subscriber database of the visited network.

Brief Summary Text (17):

The invention also relates to a method according to claim 16 for updating subscriber data relating to network-specific supplementary services in a telecommunications system, which comprises at least two mobile systems, which in turn comprise user terminals and mobile networks comprising mobile switching centres and subscriber databases, at least one user terminal functioning not only in a home network but also in at least one visited network, said terminal supporting at least one network-specific supplementary service in said visited network. The method is characterized by permanently storing subscriber data relating to the network-specific supplementary services of the visited network in an identity module of the user terminal, receiving a request of change concerning the subscriber data relating to a network-specific service, inquiring of a subscriber database of a home network for a routing address to a subscriber database of a subscriber's location area for routing the subscriber data relating to the network-specific supplementary services from a network providing the service to the subscriber database, establishing a radio connection between the user terminal and the network providing the service, performing the data transmission associated with the network-specific supplementary services between the user terminal and the network providing the service, for changing the subscriber data in the identity module, releasing the radio connection.

Brief Summary Text (18):

Home network here refers to that mobile network where the subscriber's user terminal is registered. Visited network correspondingly here refers to a mobile network which is not the subscriber's home network, but where the subscriber's user terminal can function.

Brief Summary Text (19):

The invention is based on the idea that subscriber data related to network-specific supplementary services is stored in those parts of the mobile system that are managed by the subscriber and the operator providing the supplementary services. In the solution according to the invention, subscriber data relating to network-specific supplementary services is permanently stored in the subscriber identity module of the subscriber terminal, from where it is transferred for temporary storage to the subscriber database of a visited network. Other subscriber data are read as usually from the subscriber database of the subscriber's home network. This allows limiting the changes concerning network-specific services to the network offering the service concerned. For instance, data relating to supplementary services of other networks are not needed in the subscriber database of the home network. Subscriber data related to network-specific services are transferred between the home network and a visited network using the protocols of the home network already available. The solution also includes the possibility of using a radio interface to change subscriber data relating to network-specific supplementary services from the network providing a particular service.

## CLAIMS:

18. A method for implementing the acquisition of data relating to network-specific supplementary services in a telecommunications system, which comprises at least two mobile systems, which in turn comprise user terminals and mobile networks comprising mobile switching centres and subscriber databases, at least one user terminal functioning not only in a home network but also in at least one visited network, said terminal supporting at least one network-specific supplementary service in said visited network, the method comprising the steps of initiating by said at least one user terminal the registration in the visited network, which comprises at least one network-specific supplementary service; transferring subscriber data relating to the common services of the home network and the visited network, in connection with the registration, from the subscriber database of the home network for temporary storage to the subscriber database of the visited network, permanently storing subscriber data relating to the network-specific supplementary services of the visited network in the identity module of the user terminal, the subscriber data defining network specific supplementary services in the visited network, and transmitting, at least in connection with the registration in the visited network, the subscriber data relating to the network-specific supplementary services from the identity module of the user terminal for temporary storage to the subscriber database of the visited network.

21. A method for updating subscriber data relating to network-specific supplementary services in a telecommunications system, which comprises at least two mobile systems, which in turn comprise user terminals and mobile networks comprising mobile switching centres and subscriber databases, at least one user terminal functioning not only in a home network but also in at least one visited network, said terminal supporting at least one network-specific supplementary service in said visited network, the method comprising permanently storing subscriber data relating to the network-specific supplementary services of the visited network in an identity module of the user terminal, the subscriber data defining network specific supplementary services obtainable from the visited network, receiving a request of change concerning the subscriber data relating to a network-specific service, inquiring of a subscriber database of a home network for a routing address to a subscriber database of a subscriber's location area for routing the subscriber data relating to the network-specific supplementary services

from a network providing the service to the subscriber database, establishing a radio connection between the user terminal and the network providing the service, performing the data transmission associated with the network-specific supplementary services between the user terminal and the network providing the service, for changing the subscriber data in the identity module, releasing the radio connection.

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L4: Entry 5 of 31

File: USPT

Jan 27, 2004

DOCUMENT-IDENTIFIER: US 6684073 B1

TITLE: Signalling method and conversion device for telecommunications networks

Abstract Text (1):

A signalling method and conversion device for telecommunications networks, for example mobile networks such as GSM or UMTS networks, wherein at least certain subscribers can register in their home network, or in a telecommunications network having a roaming agreement with the operator of their home network, using a first subscriber identification from the number area of their home operator, certain of these subscribers being assigned a second subscriber identification from the number area of a partner network operator with which these subscribers can register in a visited network with which operator their home network operator does not have a roaming agreement, the signalling traffic concerning subscribers who have been registered in such a visited network with a second subscriber identification number being conducted to the partner network, being filtered there, and being rerouted to their home network, and signalling traffic concerning such subscribers received in said partner network from said home network being rerouted to this said visited network.

Application Filing Date (1):

19990831

CLAIMS:

1. A signaling method for telecommunications networks in which a multiplicity of subscribers communicate using telecommunications terminals, at least one of the subscribers using a first subscriber identification assigned to the subscriber from the number area of an operator of a home network to register in the home network or in a telecommunications network whose operator has a roaming agreement with the operator of the home network, comprising: assigning a second subscriber identification to the subscriber from the number area of an operator of a partner network; the subscriber registering in a visited network with the second subscriber identification, the operator of the home network having no roaming agreement with the operator of the visited network; passing the signaling traffic concerning the subscriber registered with the second subscriber identification in the visited network to the partner network; filtering the signaling traffic concerning the subscriber registered in the visited network with the second subscriber identification and conducted to the partner network; rerouting the filtered signaling traffic to the home network including replacing, for the rerouting of the signaling traffic to the home network, the second subscriber identification contained in a signaling message protocol data unit by the first subscriber identification; and rerouting the partner network signaling traffic to the visited network, including replacing, for the rerouting of the signaling traffic to the visited network, the first subscriber identification contained in a signaling message protocol data unit of the partner network signaling traffic received from the home network concerning the subscriber registered in the visited network with the second subscriber identification.

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L4: Entry 6 of 31

File: USPT

Dec 2, 2003

DOCUMENT-IDENTIFIER: US 6658253 B1

TITLE: Method of providing services to a mobile station in visited networks

Application Filing Date (1):  
20000413

Brief Summary Text (3):

When the macrocellular communication network is formed of a GSM network, a mobility server positioned in the microcellular communication network is coupled to the GSM network and appears to the GSM network as a mobile services switching center (MSC) thereof. The wide-area, mobility management functions are used by the mobility servers of both the subscriber unit's "home" network and the "visited" network into which the subscriber unit roams thereby to provide wide-area mobility to the mobile subscriber unit.

Brief Summary Text (12):

It is sometimes desirable to permit a mobile subscriber unit, regularly registered in one microcellular communication network (the "home" network), also to communicate in another microcellular communication network (the "visited" network). For instance, a business might have separate office locations, requiring separate microcellular networks to be installed for each of the separate office locations. It is sometimes desirable, in such instances, to permit personnel regularly located at one of the office locations to be able to communicate by way of a microcellular communication network even when the personnel are temporarily positioned at the other one of the office locations.

Brief Summary Text (24):

In an another aspect of the present invention, calls originated at a Public Switched Telephone Network (PSTN) to be terminated to a mobile subscriber unit of the "home" microcellular communication network are routed to the subscriber unit when the subscriber unit roams beyond the "home" network and into a "visited" network. In one exemplary routing method, the call is routed via the home microcellular communication network to a gateway mobile services switching center (GMSC) of the macrocellular communication network, and the GMSC interrogates the home location register of the macrocellular network to obtain routing information to route the call to the roaming, subscriber unit. The HLR requests and receives information from the mobility server of the "roaming" microcellular network. Such information is provided to the GMSC, and the call is routed to the mobile subscriber unit, to be terminated thereat.

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L4: Entry 8 of 31

File: USPT

Sep 2, 2003

DOCUMENT-IDENTIFIER: US 6614774 B1

**\*\* See image for Certificate of Correction \*\***

TITLE: Method and system for providing wireless mobile server and peer-to-peer services with dynamic DNS update

Application Filing Date (1):  
19981204

Brief Summary Text (4):

Each subscriber to a wireless service is assigned to a wireless home network. The home network stores subscription information for the subscriber along with unique identification information, typically a number, for the mobile unit used by the subscriber. The subscriber is typically able to place and receive wireless calls anywhere within the home network's service area. Most subscribers are also able to place and receive wireless calls while roaming outside the service areas of their home networks since most wireless service providers either have service coverage in other areas or they have established roaming agreements with other service providers. Under roaming agreements, subscribers of a service provider that is a party to an agreement with other service providers can access networks of the other service providers in accordance with the terms of the agreement. Cellular/PCS networks accessed by subscribers roaming out of their wireless home networks are known to those skilled in the art as wireless visited networks. From the subscriber's perspective, a visited network can be either owned and operated by the same service provider who provides services in the home network, or by a different service provider with whom a roaming agreement exists.

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L4: Entry 9 of 31

File: USPT

Mar 18, 2003

DOCUMENT-IDENTIFIER: US 6535741 B1

TITLE: Telecommunications network and method for routing incoming calls for MTC services

Application Filing Date (1):  
19990930

Brief Summary Text (8):

The CAP for the first time created a protocol between M-SSP and SCP which offered roaming IN subscribers, that is subscribers who also move beyond the supply area of their home network (HPLMN, "Home Public Line Mobile Network") into other visited networks (VPLMN, "Visited Public Line Mobile Network"), intelligent services outside their home network as well while making the services available to subscribers in the home network itself. According to GSM 09.78, the CAP protocol provides a fixed set of functions, the so-called Capability Set 1 (CS1). When the CAP protocol was introduced, CAP phase 1, according to the GSM Standard relating to GSM 02.78 "Digital cellular telecommunications system (Phase 1), Customized Applications for Mobile Network Enhanced Logic (CAMEL) Service Definition (Stage 1);" GSM 03.78 "Digital cellular telecommunications system (Phase 1), Customized Applications for Mobile Network Enhanced Logic (CAMEL Phase) (Stage 2);" and GSM 09.78 "Digital cellular telecommunications system (Phase 1), Customized Applications for Mobile Network Enhanced Logic (CAMEL) CAMEL Application Part (CAP) specification," provided only a subset of the CS1. Therefore, CAP Phase 1 includes only a very limited instruction set of the intended CS1. Using the seven operations implemented in CAP Phase 1 (instead of the 29 CS1), it is not possible to implement complex intelligent services. These services require a more comprehensive set of instructions, such as those that would be available, in particular, from the CS1. In order to implement such an intelligent service, the link to an M-SSP is routed in a known way on the basis of the intermediate exchange signaling process in the ISUP, which M-SSP can manage the dialog with the SCP via an INAP protocol ("Intelligent Network Application Part"), since the operational scope of the CS1 is implemented in the INAP protocol. On the other hand, intelligent services that can be implemented within the scope of the CAP Phase 1 are not passed on, but are carried out in the relevant M-SSP.

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L4: Entry 13 of 31

File: USPT

Oct 2, 2001

DOCUMENT-IDENTIFIER: US 6298232 B1

TITLE: Voice mail service notification between mobile systems

Application Filing Date (1):  
19990115

Brief Summary Text (12):

In accordance with one aspect of the present invention, an interworking function provides home network functionality to a subscriber roaming in a visited network which operates according to a different protocol. The interworking function receives a first message from a first node according to a first protocol associated with a first network. The interworking function converts the first message from the first protocol into a second voice message notification according to a second protocol associated with a second network. The second voice message notification is sent to a second node according to the second protocol associated with the second network.

Detailed Description Text (3):

In order to implement an IWF according to exemplary embodiments of the present invention, a database is built for the subscribers who are roaming in networks, other than their home network. Accordingly, FIG. 3 illustrates an exemplary database record in the IWF database, for tracking a roaming subscriber. Field 302 contains the mobile subscriber's number in the home network, field 304 contains the subscriber number assigned to the mobile subscriber by the visited network and field 306 contains data which is used in the translation of the voice message notification. Therefore, by retrieving the record from the IWF database, the IWF has all of the information which is necessary for translation of the signaling messages between both networks. Organization and manipulation of the database is accomplished through an operations and maintenance interface (O&M). Table 1 illustrates exemplary man machine language (MML) commands used to perform different actions on the database through the O&M interface.

Detailed Description Text (7):

If there is a corresponding entry in the IWF database, in accordance with the "YES" path out of decision step 610, then the corresponding database record is retrieved, according to step 620. In step 625 it is determined whether the subscriber is registered in the IS-41 network. If the subscriber is not registered in the IS-41 network, in accordance with the "NO" path out of decision step 625, then the message waiting flag is set in the database record, in accordance with step 630. After, the message waiting flag is set, a MT Forward SM ACK message containing an error indication is sent back to the SC/GMSC, in accordance with step 615. FIG. 7 illustrates an exemplary database record in the IWF database for storing a message waiting flag. The database record contains the home network subscriber number 705, the visited network subscriber number 710 and a message waiting indicator field 715. If a subscriber is not currently active in the network when a voice message notification is received, the message waiting indicator flag is set indicating the receipt of a voice message notification by the IWF. When the subscriber later becomes active in the network, the IWF will recognize that the subscriber has a voice message waiting indicator flag, and the IWF will send a Note MS Present

message towards the GSM/HLR in order to restart the voice message notification delivery procedure.

Detailed Description Text (18):

After the IWF retrieves the database record, the IWF determines whether the subscriber is registered in the GSM network, in accordance with step 1225. If the subscriber is not registered in the GSM network, in accordance with the "NO" path out of decision step 1225, then a qualification directive ACK message is sent to the IS-41 HLR containing an error indication, in accordance with step 1215. However, if it is determined that the subscriber is registered in the GSM network, in accordance with the "YES" path out of decision step 1225, then it is determined whether a CPHS voice message indicator is supported by the operator, in accordance with step 1230. If the use of the CPHS voice message indicator in an SMS message is not supported by the operator, in accordance with the "NO" path out of decision step 1230, then the IWF retrieves from it's database the associated SMS text string for the particular subscriber, in accordance with step 1235. The text string associated with the particular subscriber can be assigned on an IWF basis, on a subscriber basis, on a home network basis, or on a visited network basis.

CLAIMS:

1. In a mobile communication system an interworking function which provides home network functionality to a subscriber roaming in a visited network which operates according to a different protocol, the interworking function comprising:

means for receiving a first message from a first node according to a first protocol associated with a first network;

means for converting said first message from said first protocol into a second voice message notification according to a second protocol associated with a second network;

means for sending said second voice message notification to a second node according to the second protocol associated with the second network.

21. In a mobile communication system a method for providing home network functionality to a subscriber roaming in a visited network which operates according to a different protocol, the method comprising the steps of:

receiving a first message from a first node according to a first protocol associated with a first network;

converting said first message from said first protocol into a voice message notification according to a second protocol associated with a second network;

sending said second voice message notification to a second node according to the second protocol associated with the second network.

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L4: Entry 14 of 31

File: USPT

Jul 3, 2001

DOCUMENT-IDENTIFIER: US 6256497 B1

TITLE: Interworking between telecommunications networks

Abstract Text (1):

A mobile telephone (UT 1) is configured for dual mode operation, so as to communicate either via an earth-orbiting satellite 3a with a satellite network (SAN 1) or through a conventional land-based cellular network (PLMN 9). In order to provide interworking between the satellite network and the land, cellular network 9, an interworking function (IWF 31) provides data to the cellular network 9 concerning the location of the user terminal (UT 1) in relation to the satellite network. The data is transmitted from the satellite visitor location register (VLR.sub.SAT 1) to the home location register (HLR) of the cellular network 9. The IWF maintains a list of roaming subscribers provisioned with services which are specific to the visited network and not available in the home network. The (IWF 31) is configured to operate with local GSM, DAMPS, PHS or other local land-based networks, depending on the geographic location of the SAN.

Application Filing Date (1):

19980324

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L4: Entry 16 of 31

File: USPT

Aug 1, 2000

DOCUMENT-IDENTIFIER: US 6097942 A

TITLE: Method and apparatus for defining and updating mobile services based on subscriber groups

Application Filing Date (1):19970918Brief Summary Text (5):

In cellular radio networks like the GSM, a Home Location Register (HLR) stores location and subscriber data of mobile radios registered in the network. When a person subscribes to receive a service from a cellular network operator, the subscription is entered into the HLR of that operator. The location information of moving mobile communications units are periodically updated in the HLR. In addition to the HLR, Visiting Location Registers (VLRs) temporarily store and retrieve location and subscription information for visiting mobile subscribers. Various information (sometimes in considerable amounts) is passed between the HLR and the VLRs, e.g., subscriber's service subscriptions when mobile subscribers are roaming either in a home network or in a visited network.

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L4: Entry 23 of 31

File: USPT

Oct 8, 1996

DOCUMENT-IDENTIFIER: US 5564068 A

TITLE: Home location register for manual visitors in a telecommunication system

Application Filing Date (1):  
19941028

Brief Summary Text (5):

In existing cellular telecommunication systems, when a subscriber leaves a home network and enters a visited network that does not have automatic roamer signaling with the subscriber's home network, that subscriber cannot originate calls until the subscriber is manually registered. With or without an operator's manual intervention, the roaming subscriber must be connected as a manual visitor with a validation against a clearinghouse or validation of a credit card. In addition, within the visited network, every time the subscriber roams from one mobile switching center (MSC) to another visited MSC, the subscriber must go through the same procedure to re-register as a manual roamer.

Brief Summary Text (8):

In a cellular telecommunication system in which mobile subscribers may roam from a home network to a visited network having an automatic roaming agreement with the home network, and to a visited network without an automatic roaming agreement with the home network, the present invention provides visiting subscribers to a visited network without an automatic roaming agreement with the subscriber's home network with the same registration capabilities as visiting subscribers to a visited network having an automatic roaming agreement with the home network.

Brief Summary Text (9):

The system of the present invention includes means within each visited network for identifying the home network of each visiting subscriber and means within each visited network for determining whether or not the home network of each visiting subscriber has an automatic roaming agreement with the visited network. The system also includes means within each visited network for classifying as an automatic visitor each visiting subscriber whose home network has an automatic roaming agreement with the visited network, and means within each visited network for classifying as a manual visitor each visiting subscriber whose home network does not have an automatic roaming agreement with the visited network. Further, the system includes means within each visited network for maintaining a database of information on manual visitors, and means for storing in the database, registration information regarding each manual visitor. The storing means stores the registration information upon each manual visitor's initial call attempt in the visited network. Finally, the system includes means for accessing from each of the visited network's mobile switching centers, the database of registration information upon each call to be delivered to the manual visitor or each manual visitor's subsequent call attempts within the visited network.

Drawing Description Text (4):

FIG. 2 (Prior Art) is an illustrative representation of three cellular radio communications networks of the type illustrated in FIG. 1, with a first network being a subscriber's home network, a second network being a visited network having

an automatic roaming agreement with the home network, and a third network being a visited network that does not have an automatic roaming agreement with the home network;

Detailed Description Text (8):

Each network may include a home location register (HLR) which stores subscriber information in a database and enables automatic updating of location and registration information for home subscribers and automatic visitors from other networks having automatic roaming agreements with the home network. When a subscriber enters a visited network that has an agreement with the subscriber's home network, and turns on his phone, the interface between the phone and the network recognizes the subscriber as being from a network having an automatic roaming agreement. The visited network makes a record of the subscriber in the MSC where the visiting subscriber is located and notifies the home network to update the location of the subscriber in the home network's database (HLR). Thereafter, calls directed to the subscriber in the home network are automatically forwarded to the visited network.

Detailed Description Text (9):

FIG. 2 is an illustrative representation of three cellular radio communications networks with a first network 11 being a subscriber's home network, a second network 12 being a visited network having an automatic roaming agreement with the home network, and a third network 13 being a visited network that does not have an automatic roaming agreement with the home network. While the networks of FIG. 2 are illustratively shown to each include three MSCs interconnected by signaling links 14, it should be clearly understood that in practice, the number of MSCs may vary and still fall within the scope and spirit of the present invention.

Detailed Description Text (10):

The home network 11 provides automatic subscriber status to all mobile subscribers subscribing to its service. Thus, a home subscriber may roam freely from MSC1 to MSC2 and MSC3 within the home network 11 without having to re-register with the home network. A signaling link 15 between the home network 11 and the visited network 12 indicates that there is an automatic roaming agreement between the home network 11 and the visited network 12 for the visited network to treat visiting subscribers from the home network as automatic subscribers. Thus, roaming subscribers from the home network 11 may roam freely between MSCs 1, 2, and 3 in the visited network 12 having the agreement.

Detailed Description Text (13):

A manual subscriber is one for which the network in which the subscriber is operating does not automatically update the location and registration of the subscriber as the subscriber roams from one MSC to another within the network. Such a situation arises when, as illustrated in FIG. 2, a subscriber from the home network 11 travels to the visited network 13 which does not have an automatic roaming agreement with the home network to provide automatic subscriber service. Manual subscribers must re-register with the visited network 13 whenever they roam from one MSC to another within the visited network. In addition, to help prevent fraud, many visited networks require such manual visitors to re-register before making each call, even if they have not roamed from a MSC in which they previously registered. Such per-call registration may be handled by a human operator or a mechanical operator with, for example, recorded voice instructions. Registration may include validation of credit card numbers or other means of making payment for cellular telephone services by accessing a database of bad credit card numbers.

Detailed Description Text (24):

Delivery of calls to manual roamers also poses an problem in existing telecommunications networks. If a subscriber roams from the home network to the visited network without agreement, the subscriber must register with the visited network before he can initiate or receive telephone calls. Otherwise, the

subscriber will get a "no service" message on his mobile station. Once the subscriber has registered with the visited network, the operator of the visited network informs the home network that the subscriber is now located in the visited network and provides an access telephone number for the visited network. The access number is often referred to as a pilot number or, preferably, a roamer port number (RPN).

Detailed Description Text (25):

Subsequently, if someone calls the subscriber at the subscriber's telephone number in his home network, the calling party will hear a message that the subscriber is now in the visited network, and providing the RPN. If the calling party dials the RPN, he obtains a dial tone for the visited network. The calling party then dials the subscriber's regular 10-digit directory number (including the 3-digit area code) in order to complete the call.

Detailed Description Text (26):

An additional problem arises most often in metropolitan areas when the visited network without agreement comprises more than one MSC. There can be only one RPN for the visited network because the RPN is connected through the Public Switched Telephone Network (PSTN) to the home network. The visited network is then a single roamer port area which includes multiple MSCs. Thus, the RPN provides a port into the visited network, but does not identify to the home network a particular MSC within the visited network in which the subscriber may be found.

CLAIMS:

1. In a cellular telecommunication system in which mobile subscribers may roam from a home network to a visited network having an automatic roaming agreement with said home network, and to a visited network without an automatic roaming agreement with said home network, a system for providing visiting subscribers to said visited network without said automatic roaming agreement with the same registration capabilities as visiting subscribers to said visited network having an automatic roaming agreement with said home network, said system comprising:

means within each visited network for identifying the home network of each visiting subscriber;

means within each visited network for determining whether or not the home network of each visiting subscriber has an automatic roaming agreement with the visited network;

means within each visited network for classifying as an automatic visitor each visiting subscriber whose home network has an automatic roaming agreement with the visited network;

means within each visited network for classifying as a manual visitor each visiting subscriber whose home network does not have an automatic roaming agreement with the visited network;

means within each visited network for maintaining a database of information on manual visitors;

means for storing in said database, registration information regarding each manual visitor, said storing means storing said registration information upon each manual visitor's initial call attempt in said visited network; and

means for accessing from each of said visited network's mobile switching centers, said database of registration information upon each manual visitor's subsequent call attempts within said visited network.

2. The system of claim 1 wherein said means within each visited network for identifying the home network of each visiting subscriber includes means for identifying the home network by reading each subscriber's mobile identification number.

7. In a cellular telecommunication system in which mobile subscribers may roam from a home network to a visited network having an automatic roaming agreement with said home network, and to a visited network without an automatic roaming agreement with said home network, a method of providing visiting subscribers to said visited network without said automatic roaming agreement with the same registration capabilities as visiting subscribers to said visited network having an automatic roaming agreement with said home network, said method comprising the steps of:

identifying the home network of each visiting subscriber within each visited network;

determining whether or not the home network of each visiting subscriber has an automatic roaming agreement with the visited network;

classifying as an automatic visitor each visiting subscriber whose home network is determined to have an automatic roaming agreement with the visited network;

classifying as a manual visitor each visiting subscriber whose home network is determined not to have an automatic roaming agreement with the visited network;

maintaining, within each visited network, a database of information on manual visitors;

storing, in said database, registration information regarding each manual visitor upon each manual visitor's initial call attempt in said visited network; and

accessing, from each of said visited network's mobile switching centers, said database of registration information upon each call to be delivered to the manual visitor and upon each manual visitor's subsequent call attempts within said visited network.

8. The method of claim 7 wherein said step of identifying the home network of each visiting subscriber within each visited network includes identifying the home network by reading each subscriber's mobile identification number.

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